



PIER Energy-Related Environmental Research

Environmental Impacts of Energy Generation, Distribution and Use

Evaluating and Reducing Avian Collision at the Cosumnes River Preserve

Contract #: 500-01-032, subcontract S0146101

Subcontractor: Marcus L. Yee

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Commission Contract Manager: Linda Spiegel

The Issue

Avian interactions with power lines and structures cause power outages that cost the state millions of dollars annually¹ and add to the mortality of protected species of raptors—as well as other large birds. The risk of avian collision with power distribution lines in California has not been adequately assessed, nor has the fatality rate attributable to collisions been calculated. Nationwide avian fatality estimates range from tens of thousands to over 1.5 million annually, illustrating the lack of a standardized and repeatable methodology.² To develop appropriate technologies that will lower the risk of collisions (and electricity costs) it is necessary to assess the problem accurately.



To date, efforts to reduce avian interactions with California's power lines and structures have been largely ineffective, due in part to the lack of effective standardized evaluation techniques. Devices designed to divert birds from danger have not yet been tested rigorously in California to assess their effectiveness and to allow for design improvements. Most diversion devices are based on the premise that if a bird can see the obstacle, it will not run into it. However, the value of these visual diversion devices in low visibility fog conditions—such as those that are common during winter months throughout California's Central Valley—has not been addressed by researchers.

¹ Energy and Environmental Economics, Inc. 2005. *The Cost of Wildlife-Caused Power Outages to California's Economy*. California Energy Commission, PIER Energy-Related Environmental Research. CEC-500-2005-030.

² Erickson, W. P. et al. 2002. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Washington, D.C.: National Wind Coordinating Committee. p. 1. www.nationalwind.org/pubs/avian_collisions.pdf.

The Central Valley is an important part of the Pacific Flyway—one of four major routes used regularly by migratory birds of all types. The topography along the Pacific Flyway has more sharply defined boundaries than the other three flyways, meaning that the millions of birds that follow this route each year adhere to a relatively predictable path, part of which includes the Central Valley. A wide range of species use areas along the flyway as wintering grounds, including many species of special concern such as the threatened-status sandhill crane that is found in large numbers on Staten Island, in the San Joaquin-Sacramento Delta.

Project Description

The PIER Environmental Area is funding research that is evaluating visual diversion devices, especially under low-visibility conditions such as fog. The results of this evaluation will be used to develop a management plan aimed at reducing sandhill crane power lines strikes on Staten Island. This investigation will be accomplished with the participation by Pacific Gas and Electric's (PG&E) avian protection program and in cooperation with The Nature Conservancy and Cosumnes River Preserve.

The Cosumnes River Preserve is located on the 9,173-acre Staten Island near Sacramento in the San Joaquin Delta. Staten Island is a recent acquisition of The Nature Conservancy, which is a partner in the Cosumnes River Preserve (see www.cosumnes.org/mission.htm). It is the ideal setting for assessing avian diversion tools in California for three major reasons: First, the island is a wintering ground for tens of thousands of migratory waterfowl—as well as the threatened-status sandhill crane, whose principal cause of post-fledge mortality was found to be collisions with power lines.³ Second, a seven-mile, single, three-phase distribution line bisects the island, cutting through avian feeding and roosting sites. Third, frequent tule fog, which obscures power lines from view, is typical of Central Valley winters.

The project can be divided into three phases: risk assessment, field testing, and establishment of a management plan.

1. *Risk Assessment.* Researcher Marcus Yee will calculate mortality along the distribution line prior to any manipulation, and incorporate bias errors to compensate for scavenger removal of carcasses, unsearchable habitat patches, and searcher oversight. Over-flight observations and habitat exploration will allow him to determine the most appropriate test diverter apparatus and its placement. The assessment of diversion devices will enable these devices to be refined, which will lead to a reduced risk of bird injuries and interruption in electrical service.
2. *Field-test Diversion Devices.* Pacific Gas and Electric will purchase and install avian flight diverters, and Mr. Yee will compare avian mortality along distribution lines before and after installation—as well as between line segments with and without diverters over the same period of time.
3. *Establish a Management Plan to Reduce Sandhill Crane Collisions with Power Lines at Staten Island.* The Nature Conservancy and Preserve Staff will collaborate with

³ Schlorff, Ronald W. 1994. 5-Year Status Review: Greater Sandhill Crane (*Grus Canadensis tabida*). California Department of Fish and Game. Wildlife Management Division. Nongame Bird and Mammal Program. Sacramento, California. 12pp. www.dfg.ca.gov/hcpb/info/bm_research/bm_pdf/rpts/94_14.pdf.

Mr. Yee to monitor avian behavior in relationship with diversion devices. Particular attention will be given to the sandhill crane. This habitat use and behavioral data, in conjunction with the success rating of diversion devices, will allow the development of a plan aimed at lowering the local mortality rate of this threatened species.

This project will determine the extent of negative avian interactions in the Central Valley's typical foggy conditions. It will develop and test methodologies for calculating bias errors and for monitoring the effectiveness of visual diversion devices.

Evaluation procedures developed and bias estimates calculated may be used as templates and guidelines for future research. The results of risk assessment and effectiveness testing of diversion tools will add to the knowledge surrounding this problem and will facilitate the development of appropriate responses to it.

PIER Program Objectives and Anticipated Benefits for California

This project offers numerous benefits and meets the following PIER program objectives:

- **Providing environmentally sound and safe electricity.** This project will determine the value of current mitigation tools, especially under extreme conditions. As a result, utilities will be able to better identify and develop appropriate and effective technologies for reducing the incidence of avian fatalities attributable to interactions with power lines in areas of heavy migration and low visibility.
- **Providing reliable electricity.** This project will help identify and develop effective tools for diverting birds from power lines. The identification and use of suitable diversion devices will decrease power service interruptions associated with avian power line strikes.
- **Providing affordable energy services.** The development of useful mitigation tools will help reduce the incidence of power outages and the need for line maintenance caused by avian collisions with power lines, saving California millions of dollars annually.

Final Report

PIER-EA staff intend to post the final report on the Energy Commission website in fall 2006 and will list the website link here.

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